AT42-06- OASIS II

Off-Axis Seamount Investigations at Siqueiros (OASIS)

&

Early Career Scientist Training Cruise at EPR 9° 50’N

R/V Atlantis, HOV Alvin, AUV Sentry

December 3 to December 20, 2018
OASIS 2 DIVE SITES
### Dive Sites Summary

<table>
<thead>
<tr>
<th>Dive (Site)</th>
<th>Start Time (UTC)</th>
<th>Start Location</th>
<th>Bottom Time</th>
<th>Speed (Avg)</th>
<th>Depth (Avg)</th>
<th>Alt (Avg)</th>
<th>Trackline Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentry519 (NEPR)</td>
<td>2018/12/06 04:12:18</td>
<td>Lat:08 22.045’N Long:104 22.442’W</td>
<td>7.0hrs</td>
<td>0.95m/s</td>
<td>2616m</td>
<td>82m</td>
<td>24.37km</td>
</tr>
<tr>
<td>Sentry520 (Coral)</td>
<td>2018/12/07 03:08:54</td>
<td>Lat:08 24.808’N Long:104 59.187’W</td>
<td>8.0hrs</td>
<td>0.95m/s</td>
<td>2763m</td>
<td>80m</td>
<td>27.64km</td>
</tr>
<tr>
<td>Sentry521 (Coral)</td>
<td>2018/12/08 01:39:59</td>
<td>Lat:08 24.808’N Long:104 59.402’W</td>
<td>9.5hrs</td>
<td>0.90m/s</td>
<td>2455m</td>
<td>74m</td>
<td>31.18km</td>
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<tr>
<td>Sentry522 (NEPR)</td>
<td>2018/12/09 04:05:14</td>
<td>Lat:08 24.712’N Long:104 25.480’W</td>
<td>7.5hrs</td>
<td>0.76m/s</td>
<td>2379m</td>
<td>85m</td>
<td>20.99km</td>
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<tr>
<td>Sentry523 (EPR)</td>
<td>2018/12/10 09:02:05</td>
<td>Lat:09 50.410’N Long:104 17.909’W</td>
<td>2.9hrs</td>
<td>0.93m/s</td>
<td>2440m</td>
<td>67m</td>
<td>9.85km</td>
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<tr>
<td>Sentry524 (EPR)</td>
<td>2018/12/11 01:44:04</td>
<td>Lat:09 50.201’N Long:104 17.805’W</td>
<td>10.2hrs</td>
<td>0.59m/s</td>
<td>2484m</td>
<td>23m</td>
<td>21.94km</td>
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<td>Sentry525 (EPR)</td>
<td>2018/12/12 01:37:01</td>
<td>Lat:09 50.810’N Long:104 17.957’W</td>
<td>10.3hrs</td>
<td>1.00m/s</td>
<td>2465m</td>
<td>67m</td>
<td>37.65km</td>
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<tr>
<td>Sentry526 (EPR)</td>
<td>2018/12/13 02:07:36</td>
<td>Lat:09 51.649’N Long:104 17.203’W</td>
<td>9.9hrs</td>
<td>1.04m/s</td>
<td>2449m</td>
<td>66m</td>
<td>37.41km</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>65.3hrs</strong></td>
<td></td>
<td><strong>211.03km</strong></td>
<td></td>
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</tbody>
</table>
Sentry maps overlaid on EM2000 bathymetry
Summary of Rock Sampling for 8° 20’N Seamount Dives
Dive 5002: 14 lava samples and 2 sediment push cores
Dive 5003: 17 lava samples, 2 push cores, 1 Mn crust
Dive 5004: 7 lava samples, 2 push cores, 2 Mn pavement samples and 1 sulfide
Dive 5005: 12 lava samples and 2 samples of Mn pavement.
NEPR Seamount
Pillow Lavas

Base of NEPR

GoPro IMAGE

Summit of NEPR
QUIESCENT IMAGING FOR DEEP-SEA SCIENCE: ADVANCES IN TECHNOLOGY AND PRODUCTIVITY

By Daniel J. Fontan – Woods Hole Oceanographic Institution
Aaren Steiner – DeepSea Power & Light (DSPL)
Stacey Church – DeepSea Power & Light (DSPL)
EB Pennon – EP-Oceanographic, LLC & Ocean Imaging Systems

Special thanks to the Woods Hole Oceanographic Institution and the DSPL team for their contributions to this article, as well as to the National Science Foundation’s Division of Ocean Sciences for their support.

Since its emergence in the 19th century, underwater imaging has been responsible for many of the discoveries and advancements in the oceanographic sciences. With over 80% of the ocean undiscovered according to the National Oceanic and Atmospheric Administration (NOAA), the need for high-quality underwater imaging remains true today. Mapping the seafloor, studying the geochemical processes taking place in the ocean, observing marine life, and the myriad of other research initiatives related to understanding the world’s oceans all benefit from high-resolution, data-rich images. Photographic and direct observations of the ocean floor are intimately tied to understanding the dynamic and interactive physical, chemical, and biological processes occurring there.

HISTORY AND TECHNOLOGICAL DEVELOPMENTS

Subsea imaging can be traced to the earliest days of underwater photography when French inventor Ernest Basque took photographs from a diving bell in the 1860s. Nearly a century later, Harold Edgerton, an engineering professor at MIT, developed the deep-sea stroboscopic light, providing the “twilight” required to take photographs of the deep ocean and seafloor for the first time. That development, coupled with the engineering efforts at the Lamont Geological Observatory of Columbia University and the Woods Hole Oceanographic Institution (WHOI), led to the first generation of modern deep-sea cameras. These systems were simple by today’s standards, but they provided key photographic evidence of animals and seafloor features over small areas in the deep ocean.

Subsea imaging capability leaped forward with the advent of digital imaging. Today, the ability to digitally image a large area and merge the constituent images together in a photomosaic provides a powerful tool for mapping and understanding the geological relationships between features of various dimensions—ranging from centimeter scale to tens or hundreds of meters in size. Biological features on the seafloor, and the distribution of biota in different environments, also lend themselves to precision study using digital images and mosaics. Revisiting various deep-sea study areas is now common, and has been an important research theme within the US Ridge 2000 Program.

SUBSEA IMAGING AT WOODS HOLE OCEANOGRAPHIC INSTITUTION

High-resolution subsea imaging is at the core of the research performed at the Multidisciplinary Instrumentation in Support of Oceanography (MISO) Facility at the Woods Hole Oceanographic Institution (WHOI). MISO was developed with National Science Foundation—Ocean Sciences (OCE) Division funding to support US investigators requiring deep-sea digital imaging and sampling capabilities for seafloor experiments and surveys. MISO imaging systems have been used for a diverse suite of geological, biological, and bio-geochemical investigations ranging from deep-sea coral studies, benthic biology surveys, hydrothermal vent research, and mid-ocean ridge and seamount volcanism, among others.

The WHOI-MISO Towed Digital Camera System (iFlowCam) and related deep-sea imaging resources provide 6,000 m depth...